

DESCRIPTIONS OF NEW NEARCTIC CECIDOMYIIDAE (DIPTERA)
THAT LIVE IN XYLEM VESSELS OF FRESH-CUT WOOD,
AND A REVIEW OF *LEDOMYIA* (S.STR.)

RAYMOND J. GAGNÉ

Systematic Entomology Laboratory, IBIII, Agricultural Research Service, USDA, % U.S. National Museum of Natural History, NHB 168, Washington, D.C. 20560.

Abstract.—The six species discovered during a study of cecidomyiids associated with xylem vessels in fresh-cut wood are described here as new to science. These are: *Xylodiplosis longistylus*, the first record of this genus in North America; the monotypic *Trogodiplosis flexuosa*, especially notable for its sexually dimorphic adult mouthparts; *Ledomyia emilyae*, *L. mira*, and *L. parva*; and *Trichopteromyia denticauda*, the second species known for the genus. *Trogodiplosis* is a new genus erected to contain *T. flexuosa*. *Ledomyia* (sensu stricto) is redefined and reviewed and a key is given to the seven Nearctic species.

A guild of cecidomyiids that lives in xylem vessels of fresh cut or newly fallen wood was recently discovered by Emily A. Rock of the Department of Biology, University of Akron, Ohio. The biology of these species is treated in a companion paper directly following this one (Rock and Jackson, 1985). The guild comprises at least four genera in three separate tribes or supertribes of Cecidomyiidae. In North America it consists of the six new species that were discovered by Rock and at least six other species implicated from indirect evidence. The new species of *Xylodiplosis* is the first record of that genus in North America; the new monotypic genus, *Trogodiplosis*, is erected for the only known cecidomyiid with sexually dimorphic mouthparts; the three new species of *Ledomyia*, a genus not previously known to be associated with xylem vessels, serve as a pretext to define the generic limits of that genus and to present a key to the North American species; and the new species of *Trichopteromyia* is the only known congener of a species that has a worldwide distribution and has also been reared from wood.

***Xylodiplosis* Kieffer (Cecidomyiinae:
Supertribe Cecidomyiidi)**

The new species of *Xylodiplosis* described here represents the first record of the genus for North America. Three European species were listed under *Xylodiplosis* in Kieffer (1913): *praecox* (Winnertz), *nigritarsis* (Zetterstedt), and *aestivalis* Kieffer. All three are poorly known, the types of two are presumed lost, at least one may not be properly referred to the genus, and no comprehensive systematic study has been made on these species. This may be why no specific identification has

been given in recent studies that have referred only to a "*Xylodiplosis* sp." (Barnes, 1951; Möhn, 1955; Mamaev and Krivosheina, 1965).

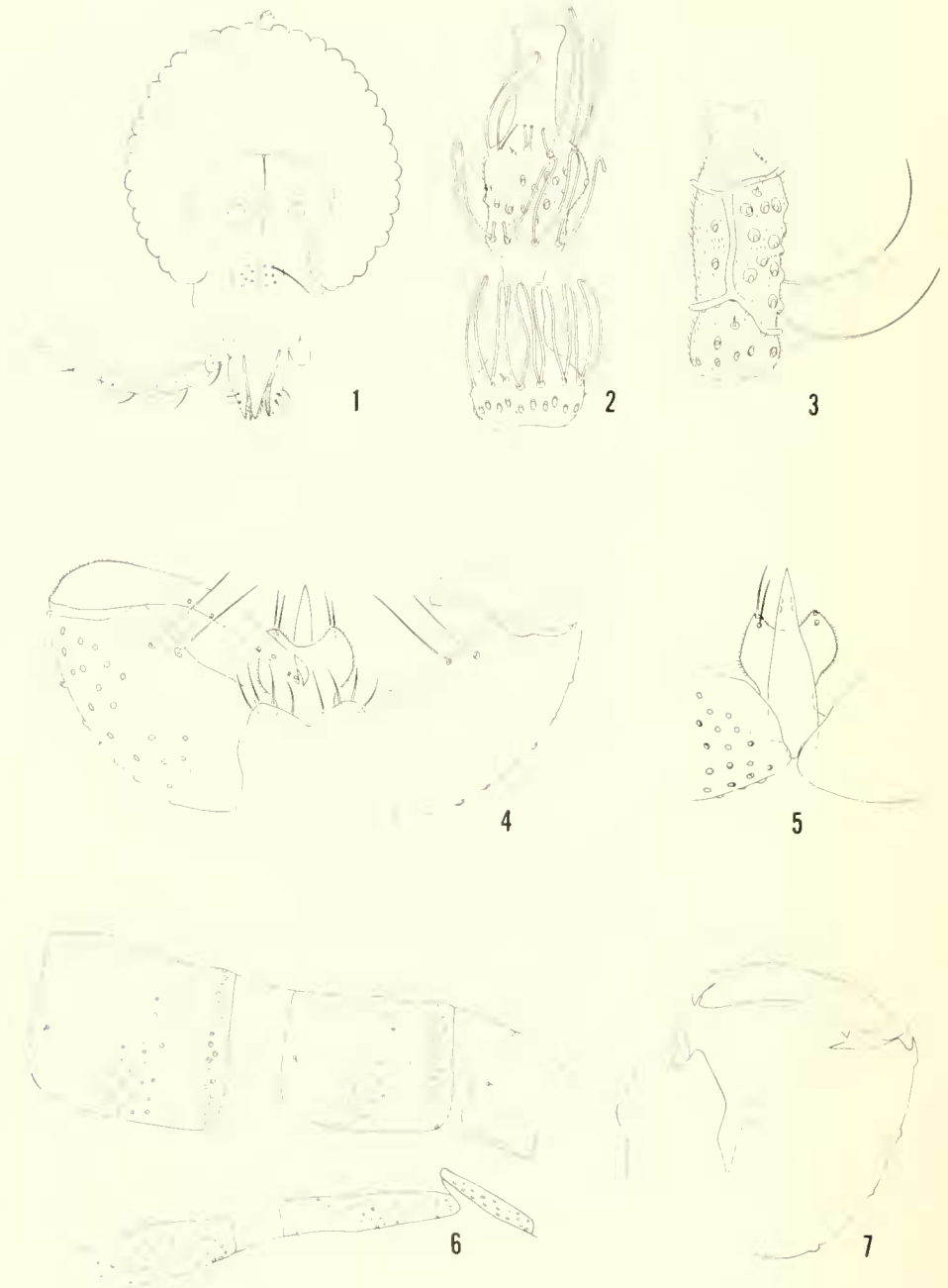
Diagnosis.—*Adult*: Eyes very extensive, about 15 facets long at vertex. Post-vertical peak long, narrow. Male flagellomeres regular, binodal, tricircumflar. Female flagellomeres cylindrical, regular. Wing with long, curved R_5 . Tarsal claws simple, bent near basal third. Male genitalia: cerci convex, short; hypoproct concave posteriorly; aedeagus short, pointed, and gonocoxites unlobed. Ovipositor long, protrusible, the cerci short, ovoid, separate. *Larva*: Spatula present, clove-shaped, anal segment with 1 pair of papillae corniform, recurved.

Möhn (1955) suggested that larval characters aligned this species with *Contarinia* and its relatives. The shape of the male genitalia of *Xylodiplosis* is further evidence of the relationship. If the two genera are related, the shape of the tarsal claws in Cecidomyiidi, at least, must lose some importance as a distinguishing character for higher categories.

Xylodiplosis was described by Kieffer (1895) for specimens he identified as *Cecidomyia praecox* Winnertz. Earlier Winnertz (1853) had based that species on a female or females collected on freshly cut logs in the vicinity of Bonn, Germany. His specimens were presumably destroyed with the rest of his collection in Bonn during World War II. Kieffer (1900) gave a fairly detailed description of his observations of the biology of this species in the environs of Bitche, Alsace, now in France, then part of the German Empire. In 1904, Kieffer described a new species, *Xylodiplosis aestivalis*, also from logs, and outlined some differences between that species and *praecox*. Kieffer evidently kept no specimens of these species but gave a series of both to Felt. The purported differences in the antennae, wings, and legs are not evident in Kieffer's series of *praecox* and *aestivalis* now in the Felt Collection. Although no females are in the *praecox* series, it seems unlikely that that species could lack the hyaline, sensory setae on the female cerci according to Kieffer's description, inasmuch as all known species of the supertribe Cecidomyiidi have them.

Felt (1911) transferred *Cecidomyia nigratarsis* Zetterstedt (1856) to *Xylodiplosis*, but as a junior synonym of *praecox* (Winnertz). Kieffer (1913) gave *nigratarsis* full species ranking. *Xylodiplosis nigratarsis* was described from 2 females from Denmark that Zetterstedt implied fit the description of the female of *Cecidomyia nigra* Meigen and Meigen's (1818) illustration of a whole female. That illustration could represent a *Xylodiplosis* female in gross aspect and was probably Felt's basis for assigning *nigratarsis* to the genus, but the figure could as well represent other taxa such as *Resseliella* spp. and *Contarinia* spp. Zetterstedt's types are probably extant in Copenhagen, and it should be possible in due course to assign the specimens at least to genus.

In addition to the three European species, four Indian species have been placed in *Xylodiplosis*. They are *Xylodiplosis kempfi* Mani (1934), known from a male and female caught in flight, *Xylodiplosis fici* Grover (1967a) from fruit of *Ficus carica* L. (Moraceae), *Xylodiplosis orientalis* Grover (1967b) from leaf galls of *Ficus religiosa* L., and *Xylodiplosis sisso* Bakhshi and Grover (1976) (unjustifiably emended to *sissoa* Grover in 1979), from buds of *Dalbergia sissoo* Roxb. ex DC. (Fabaceae). *Xylodiplosis kempfi* possibly belongs to *Xylodiplosis*, but the other three species belong elsewhere inasmuch as their tarsal claws are curved beyond midlength, unlike those of true *Xylodiplosis* spp.



Figs. 1-7. 1-6, *Xylodiplosis longistylus*. 1, Head of male. 2, Male flagellomere 4. 3, Female flagellomere 4. 4, Male genitalia (dorsal). 5, Aedeagus and hypoproct (ventral). 6, Male abdominal segments 6-8. 7, *Xylodiplosis nigratarsis* male genitalia (partial, dorsal).

Xylodiplosis longistylus Gagné, NEW SPECIES

Figs. 1-6, 8-12

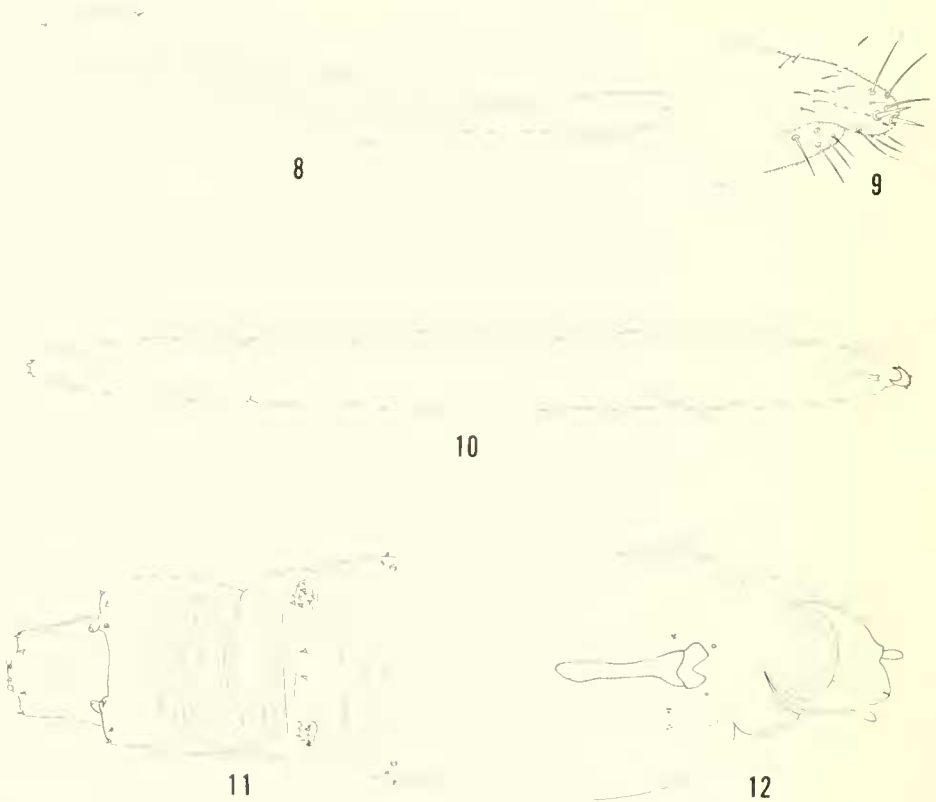
Adult.—Body and appendages uniformly dusky. *Head* (Fig. 1): Eyes about 15 facets long at vertex; facets hexagonoid, closely approximated. Postocciput reduced in size, abruptly narrowing dorsally to long peak bearing several large setae. Frontoclypeus with several setae. Labrum long, pointed, rimmed laterally with long setulae. Hypopharynx long, pointed, laterally with long, dense setulae. Labella long and narrow in frontal view, hemispherical in lateral view, with several long, wide setae laterally and 2 short setae and long pile mesally. Palpus 4-segmented. Antennal flagellomeres 1 and 2 connate; male flagellomeres (Fig. 2) binodal, tricircumfilar, the circumfilar loops subequal except in apical set with 2-3 loops longer than others; length of nodes, internode, and neck variable; female flagellomeres (Fig. 3) cylindrical, the circumfila regular, short looped.

Thorax: Scutum with 2 dorsocentral and 2 lateral rows of setae. Anepisternum with scattered scales on dorsal half. Anepimeron with several setae. Wing: C broken at juncture with R₅; R₅ long, curved apically to join C beyond wing apex; Rs not evident; M₃₊₄ weak; Cu forked. Legs long. Tarsal claws robust, untoothed, bent near basal third. Empodia attaining bend in tarsal claws.

Male abdomen (Figs. 4-6): Tergites 1-6 rectangular, with caudal row of setae mostly single, continuous, many lateral setae, covered with scales, and with basal pair of trichoid sensilla; tergite 7 as for preceding except caudal row with mostly double row of setae with fewer scales; setose area of tergites more strongly sclerotized than elsewhere; tergite 8 rectangular but weakly sclerotized caudally, without vestiture except pair of trichoid sensilla. Sternites quadrate, mostly covered with setae and setiform scales, and with 2 closely approximated trichoid sensilla; caudal area usually more strongly sclerotized than elsewhere. *Terminalia* (Figs. 4-5): cerci short, broadly rounded to straight at apex, with 4 caudoventral setae; hypoproct widest beyond midlength, then narrowing to concave caudal edge, with 2 pairs of caudal setae and evenly short-setulose; aedeagus longer than hypoproct but shorter than gonocoxites, narrowing gradually from base to pointed apex; gonocoxite without prominent mesobasal lobes, mesal surface with 2 strong setae, remainder evenly setose; gonostylus narrow, slightly longer than gonocoxite, setulose only basolaterally, with several short setae along its length. Gonocoxal apodemes not conspicuous.

Female abdomen (Figs. 8-9): Tergites 1-7 wider than long, vestiture as for male but more extensively scaly; tergite 8 longer than wide, with scattered short setae and basal pair of trichoid sensilla; caudal margin more strongly sclerotized than elsewhere. Sternites 1-7 as for male but longer and progressively narrower from basal to apical segments. Ovipositor (Fig. 8) long, but extremely variable in length, the distance from tergite 7 to the cerci from 1-2 times length of abdomen. Cerci (Fig. 9) short, dorsolaterally-ventromesally flattened, with several setae of varying length, 2 strong sensory setae, and covered with setulae. Hypoproct short with 2 long setae. Caudal area ventrad of ovipositor mesally divided into 2 short lobes.

Last instar larva (Figs. 10-12).—Body extremely long and slender with horizontally striated integument. Basic complement of papillae for supertribe present (Möhn, 1955) but setae very short; anal segment with 3 pairs of setiform and 1



Figs. 8–12. *Xylodiplosis longistylus*. 8, Female abdominal segments 7 to end. 9, Female cerci. 10, Larva (ventral). 11, Posterior segments of larva (dorsal). 12, Anterior segments of larva (ventral).

pair of corniform papillae. Spatula clove-shaped. Tergum 7 with area surrounding lateral pairs of dorsal papillae conspicuously spinose.

Holotype.—♂, reared from larvae out of xylem vessels of hickory (*Carya* sp.), 10-IX-1981, Canal Fulton, Ohio, E. Rock, deposited in NMNH, Washington, D.C. Paratypes (unless otherwise stated, all are adults reared from larvae out of xylem vessels in Canal Fulton, Ohio by E. Rock): 2 ♀, same data as holotype; ♂, ♀, hickory, 28-VIII-1981; larva, 8-VI-1981; ♂, ♀, elm (*Ulmus* sp.), 28-VIII-1981; ♂, ♀, elm, 14-IX-1981; 5 larvae, elm, 25-IX-1981; 3 ♂, ♀, willow (*Salix* sp.), 1-3-IX-1981; 5 larvae, willow, 24-VIII-1981; ♂, 2 ♀, ash (*Fraxinus* sp.), 7-IX-1981; ♂, ash, 1-IX-1981; 5 larvae, ash, 17-VIII-1981; 2 ♂, 7 ♀, sassafras, 28-VII-1982; 6 ♀ caught with ovipositor stuck in xylem vessels, sassafras (*Sassafras albidum* (Nutt.) Nees.), 26-VII-1982; ♂, ♀, sassafras, 31-V-1982; 5 larvae, oak (*Quercus* sp.), 8-VIII-1981; 3 larvae, oak, 31-VII-1982; larva, oak 9-IX-1981; 2 ♂ caught in Malaise trap, 15-VIII-1972, Silver Spring, MD, W. W. Wirth.

The new species was compared with adult specimens that were identified by J. J. Kieffer as *Xylodiplosis praecox* (Winnertz) and *Xylodiplosis aestivalis* Kieffer and are presently in the Felt Collection in the National Museum of Natural History in Washington. Males of both European series are similar and do not show the

differences between them outlined by Kieffer (1903); both series differ from *longistylus* only in their much shorter gonostylus and somewhat narrower hypoproct (Fig. 7). Kieffer's females are similar to those of *longistylus*. The larva of the new species resembles the illustrations of a *Xylodiplosis* sp. from Germany in Möhn (1955) except that the peculiar spinose areas found on abdominal tergum 7 of the American species were not noted for Möhn's species. Larvae from oak in England sent to me by K. M. Harris, Commonwealth Institute of Entomology, London, fit the new species in all particulars. A male specimen he loaned to me differs from both the American species and Kieffer's series by the posterior border of the hypoproct being convex instead of concave. Its gonostyli are slightly longer than those of Kieffer's series, but are still much shorter than those shown here for *longistylus*.

The name *longistylus* is a noun in apposition and refers to the long gonostylus.

***Trogodiplosis* Gagné, NEW GENUS (Cecidomyiinae:
Supertribe Cecidomyiidi)**

Adult.—*Head*: Eyes very extensive, about 17 facets long at vertex. Postocciput very narrow, terminating in long dorsal peak with 2 long setae. Male antennal flagellomeres binodal, tricircumfilar. Mouthparts sexually dimorphic, in male unmodified from usual plan of supertribe, in female larger, more inflated than in male, the hypopharynx lined laterally with large, wide teeth instead of more usual, long setulae. Palpus 4-segmented. *Thorax*: Wing with long, curved R₅, weak M₃₊₄, without evident Rs. Legs long. Tarsal claws robust, bent near basal third, un-toothed.

Male abdomen: Tergites 1–7 rectangular, with basal pair of trichoid sensilla and caudal and lateral setae; tergite 8 without vestiture except basal pair of trichoid sensilla. Sternites 2–8 with trichoid sensilla. Cerci narrow, triangular. Gonocoxite angular, gonostylus strongly curved, mostly striate. Hypoproct covered with re-curved setulae. Aedeagus short, pointed.

Female abdomen: Tergites 1–7 as for male; tergite 8 longer than wide, with short, caudal setae, and basal pair of trichoid sensilla. Sternites 2–7 with trichoid sensilla. Ovipositor extremely long, much longer than abdomen. Cerci separate, small, setose and setulose throughout, each with 2 apical trichoid sensilla.

Larva unknown.

Type-species, *Trogodiplosis flexuosa* Gagné, by present designation.

The female mouthparts are unique among known Cecidomyiidae, particularly in the inflated labella and the hypopharynx lined with "teeth" in place of the usual long setulae. The female abdomen is generally similar to that of *Xylodiplosis*, perhaps because they are adapted to the same use. The length of the ovipositor and the diminutive cerci are presumably adaptations for laying eggs within xylem vessels. The male genitalia are unlike any other genus known to me. The claws bent near the basal third are a character shared with *Xylodiplosis*, but also with many genera such as *Clinodiplosis*, *Karshomyia*, and *Aphodiplosis*, whose larvae are mycophagous.

The name *Trogodiplosis* is of feminine gender and is derived from the Greek "trox," to chew, and "diplosis," double. The latter part is a common suffix for genera in the supertribe Cecidomyiidi in reference to the binodal male antennal

flagellomeres. The peculiar female mouthparts may be used for rasping or chewing, but their action has not been observed.

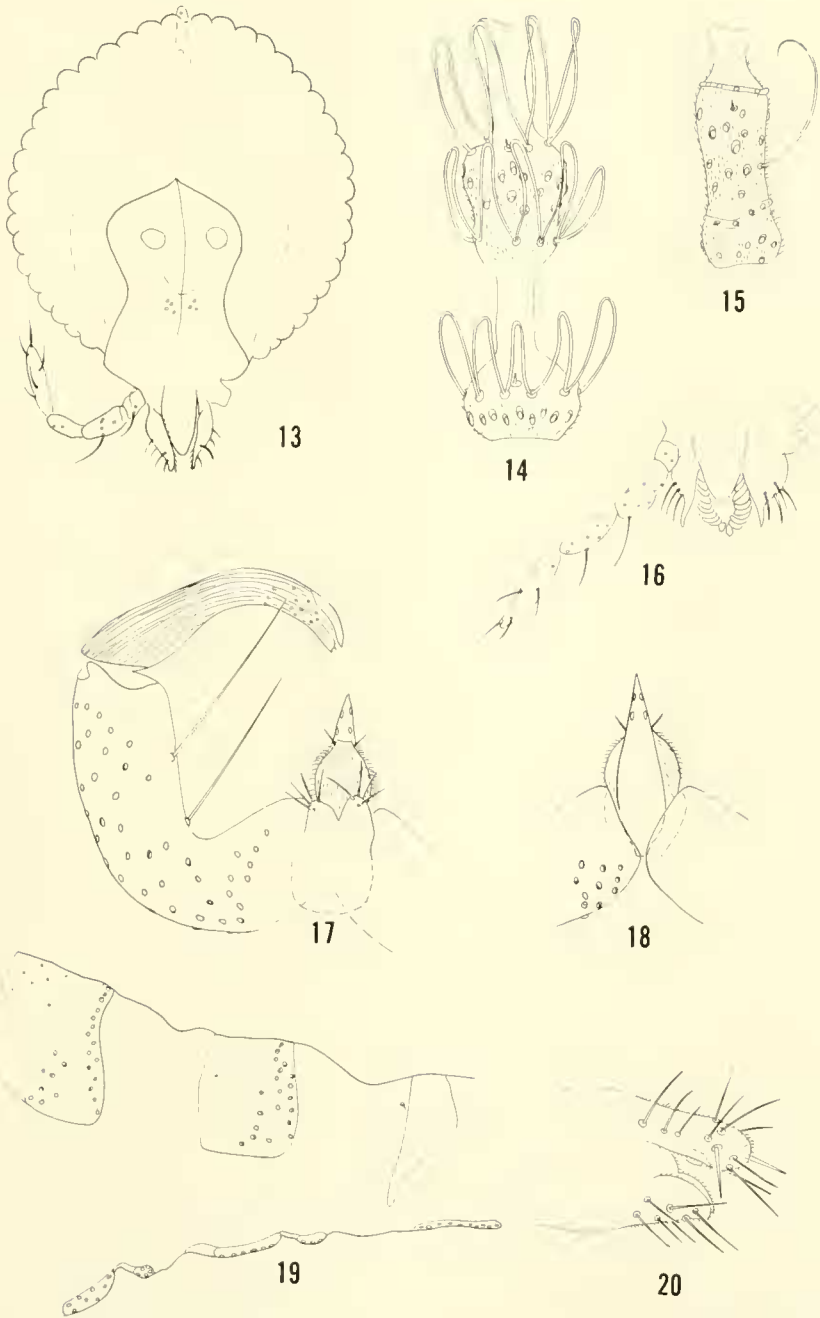
Trogdiplosis flexuosa Gagné, NEW SPECIES

Figs. 13–20

Adult.—Body dusky but antennae and legs usually with alternating light and dark bands; wings usually light with some dark areas. *Head* (Figs. 13, 16): Eyes very large, about 15 facets long at vertex; facets hexagonoid, closely approximated. Frontoclypeus with several setae. Male mouthparts (Fig. 13): labrum narrower, longer than in female, without long setulae laterally, with 2 peg-like setae ventrally; labella in frontal view laterally convex and drawn to a point apically, with several long lateral setae, 2 short setae on mesal surface, and covered with setulae mesoventrally; hypopharynx long, attenuate, with long lateral setulae. Female mouthparts (Fig. 16): swollen, larger than in male; labrum convex, tapering to rounded, glabrous tip, without setulae but with 2 peglike setae ventrally; labella more convex than in male, tapered abruptly before apex; hypopharynx glabrous, the margin in frontal view modified into a ring of large, wide, closely appressed teeth. Palpus 4-segmented. Antennal flagellomeres 1 and 2 connate; male flagellomeres (Fig. 14) binodal, tricircumfilar, the circumfilar loops subequal within a set; female flagellomeres (Fig. 15) cylindrical, with necks slightly longer than wide, the circumfila regular. *Thorax*: Scutum with 2 dorsocentral and 2 lateral rows of setae. Anepisternum without vestiture. Anepimeron with several setae. Wing: C broken at juncture with R₅; R₅ long, curved apically to join C beyond wing apex; Rs not evident; M₃₊₄ weak; Cu forked. Legs long. Empodia attaining bend in tarsal claws.

Male abdomen (Figs. 17–19): Tergites 1–6 with mostly single, continuous row of caudal setae, many lateral setae, anterior tergites generally covered with scales, posterior ones with fewer scales; tergite 7 as for preceding segment except with mostly double caudal row of setae and with fewer scales; setose areas more strongly sclerotized than elsewhere, caudal and lateral areas discrete except continuous on tergite 7; tergite 8 without vestiture except for pair of trichoid sensilla, sclerotized only basally, sclerotization invading the pleural area. Sternites quadrate, mostly covered with setae and setiform scales and with 2 closely approximated trichoid sensilla; caudal and midlength areas usually more strongly sclerotized than elsewhere. Terminalia (Figs. 17–18): cleft between cerci shallow, cerci triangular; hypoproct shorter than aedeagus and covered with long, recurved setulae, with several short, apical setae; aedeagus shorter than gonocoxite or gonostylus, tapering evenly from base to pointed apex; gonocoxite covered with setae except mesal surface with only 2 long setae; gonostylus more or less evenly cylindrical except for basal bulge and strongly curved, with scattered short setae on distal third, aetulose, striate.

Female abdomen: Tergites 1–7 wider than long, vestiture as for male but more extensively scaly; tergite 8 longer than wide, with scattered short setae and basal pair of trichoid sensilla; caudal margin more strongly sclerotized than elsewhere. Sternites 1–7 as for male but longer and progressively narrower from basal to apical segments. Ovipositor extremely long, sinuously curved inside abdomen. Cerci (Fig. 20) short, dorsolaterally-ventromesally flattened, with several setae of varying length, 2 strong transparent setae, and covered with setula. Hypoproct short with 2 long setae. Part below egg exit mesally divided into 2 short lobes.



Figs. 13-20. *Trogodiplosis flexuosa*. 13, Male head. 14, Male flagellomere 4. 15, Female flagellomere 4. 16, Female mouthparts and palpus. 17, Male genitalia (dorsal). 18, Aedeagus and hypoproct (ventral). 19, Male abdominal segments 6-8. 20, Female cerci.

Holotype.—♂, reared from larvae out of elm (*Ulmus* sp.) xylem vessels, VIII-28-1981, Canal Fulton, Ohio, E. Rock, deposited in NMNH, Washington, D.C. Paratypes: 3 ♂, 2 ♀, same data as holotype; 3 ♀, from larvae out of oak (*Quercus* sp.), 21-VIII-1981, Canal Fulton, Ohio, E. Rock; 2 ♂, 2 ♀, from larvae out of oak, IX-1982, Akron, Ohio, E. Rock; 12 ♂, light trap, VIII-1972, Silver Spring, MD, W. W. Wirth.

I know the male of another, undescribed species of *Trogodiplosis* caught in flight in Maryland. It is similar to *flexuosa* except that the gonocoxal lobe bears strong basal spines.

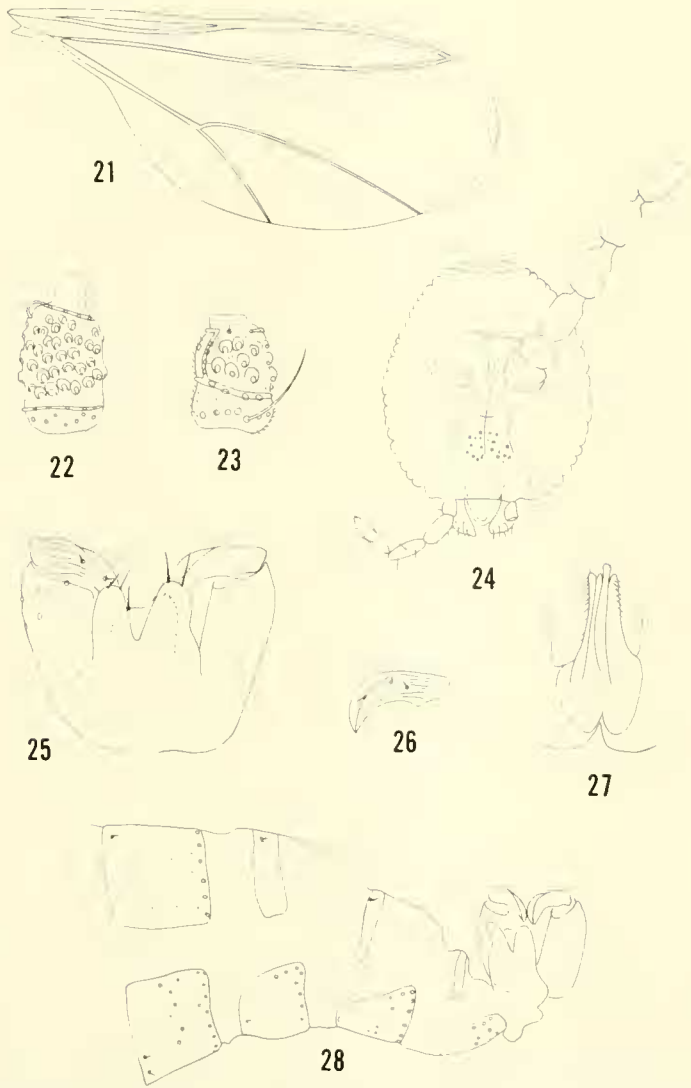
The name *flexuosa* is an adjective and refers to the long sinuous ovipositor.

***Ledomyia* Kieffer (Cecidomyiinae:
Supertribe Oligotrophidi)**

The concurrent discoveries of three new species of *Ledomyia* and of a possible type-specimen of *Ledomyia lugens* (Kieffer), the type-species of the genus, make this a good occasion to review the genus and present a key to the known North American species. I am able to narrow the definition of the genus to include three new species reared from oak and hickory and four other Nearctic species previously listed under *Ledomyia* only in the broad sense (Gagné, 1976). The genus in the strict sense also includes the name *Neuromyia* Felt and one Afrotropical and at least five Palearctic species. All the species are probably xylophilous, although only three previously described ones have been associated with logs.

Diagnosis.—*Adult*: Posterior surface of head, much of mesonotum, wing, legs, and abdomen covered with scales; vestiture usually yellow-brown on head, mesonotum and some leg surfaces, brown elsewhere. Eye bridge short, 4–5 facets long, entirely on anterior surface of head; facets circular, slightly farther apart at eye bridge and at midheight of eye than elsewhere. Antenna with 8–12 flagellomeres. Frontoelypeus with several setae and interspersed scales. Labrum and hypopharynx triangular, shorter than labellae; labellae hemispherical in frontal view, with several scales laterally. Palpus 4-segmented. Scutum with lateral and dorsocentral rows of setae, disposition of scales variable. Anepimeron with vertical row of setae. Wing: R_5 joining C anteriorly of wing apex; M_{3+4} not evident; C forked at about midlength, the tines widely separated. Fore tarsal claws with, mid and hind claws with or without teeth; when toothed, claws broadly rounded at midlength, when untoothed, abruptly rounded; empodia as long as claws, pulvilli about half as long.

Abdomen: Tergites 1–5 rectangular, the fifth narrower than preceding, each with single, continuous row of caudal setae, 0 lateral setae, a basal pair of widely separated trichoid sensilla, and elsewhere covered with scales. Sternites 2–5 rectangular, with mostly single, continuous row of caudal setae, a sparse horizontal row of setae at midlength, 2 basal, closely approximated trichoid sensilla, and covered with scales elsewhere including area immediately cephalad of caudal row of setae. Male: tergites 6–8 very short, with sparse vestiture; sternites 6–8 long, large, but each narrower than preceding; gonocoxites simple, robust; gonostyli short, dorsoventrally-flattened, long-toothed; hypoproct simple, concave caudally; elaspettes subdivided apically, lateral projection glabrous, the mesal with recurved setulae. Female: tergites 6–8 and sternites 6–7 variable; ovipositor short to very



Figs. 21–28. *Ledomyia* spp. 21, *L. parva*, wing. 22, *L. emilyae*, male flagellomere 4. 23, *L. nira*, female flagellomere 4. 24–28, *L. emilyae*. 24, Male head. 25, Male genitalia (dorsal). 26, Gonostylus. 27, Aedeagus and claspettes. 28, Male abdominal segments 5 to end.

long; when long, twice telescoped; cerci separate, each with 2 ventrolateral sensory setae and assorted vestiture.

Last instar larva (Figs. 38–40): Integument reticulate, with clove-shaped spatula, a sclerotized structure on dorsum of prothorax, circular spinose area on dorsum of anal segment, and elliptical papillae between segments. Papillar pattern as follows (all numbers given for one longitudinal half of body): supernumerary segment with 1 dorsal and 2 ventrals; each thoracic segment with 3 + 2 dorsals

(2 without setae; 1 of these aligned with the 3 with setae, the other sited more cephalad), 2 pleurals, 1 interior pleural, 2 groups of 3 laterals, and 1 sternal; abdominal segments 1–8 with 3 + 2 dorsals (arranged as for thorax), 1 posterior ventral (except segment 8 with 2), and 2 anterior ventrals; anal segment with 3 anal papillae and 4 terminals.

A noteworthy characteristic of *Ledomymia* adults is that abdominal sternites 2–5 are uniformly sclerotized, without the weakened area usually seen in Oligotrophidi immediately cephalad of the caudal row of setae. The scales on those sternites are continuous on the whole sclerite, without the usual interruption immediately cephalad of the caudal setal row. Within the genus the female postabdomen is remarkably diverse in structure, as can be seen by comparing Figs. 29–37, and the antennal flagellomeres vary in number. Edwards (1937) suggested that females of a particular species might have all toothed claws while males had only the fore claws untoothed. The actual situation is even more unusual, with females of a given species having either all or only the fore claws toothed. Because the female abdomens are so distinctive among species, I have chosen females as holotypes of the 3 new species described here.

The larva of only one species of *Ledomymia* is known, that of *Ledomymia flavotibialis* (Felt). I have illustrated parts of it in detail in Figs. 38–40. Of particular note are the reticulated integument, and the presence of elliptical papillae between the segments, a circular area with recurved setulae on the dorsum of the terminal segment, a unique, sclerotized structure on the dorsal surface of the prothorax, and 10 dorsal papillae on abdominal segments 1–7. The 4 extra dorsal setae have not been noted in other Oligotrophidi.

Since Felt (1911), the name *Lasiopteryx* Stephens has been applied to some *Ledomymia* species. Although *Lasiopteryx* cannot properly be used for these species, it has been, so it is worth giving a brief synopsis here of its complicated history. Meigen (1818) described the genus *Lasioptera* with 2 divisions, A and B, and described several species in each. Division B contained species having the first tarsal segment longer than the others, a character that precludes referring that division to the Cecidomyiinae. Stephens (1829), in a list of species in his own collection, gave the name *Lasiopteryx* to Meigen's division B and listed under it only one named species, *obfuscata* Meigen. His specimen was not properly identified. Westwood (1840) later designated *obfuscata* Meigen as type-species of *Lasiopteryx* Stephens and cited the long first tarsal segment of Meigen's description, not the specimen determined as *obfuscata* in Stephen's collection. Felt (1911) redescribed *Lasiopteryx*, basing his concept on Stephen's specimen. That specimen has a short first tarsal segment so cannot fit *obfuscata* of Meigen. A figure drawn by Meigen of a wing of *Lasioptera obfuscata* was published in Morge (1975). The wing could belong to a *Brachineura* but not to any lestreminiine, which still would not agree with the particular tarsal character Meigen noted. Meigen could have been mistaken about this character in his *Lasioptera obfuscata*, but it is also possible that the wing drawn by Meigen was from a specimen other than that on which he based his original description. Because it seems impossible to know what Meigen had before him, *Lasiopteryx* should be considered a nomen dubium.

Type specimens of most of Kieffer's types do not exist, but I found a possible type of his *Ledomymia lugens*, the type-species of *Ledomymia*, mounted on a slide in the Felt Collection and labelled "*Ledomymia lugens* Kieff./Type/from J. J. Kief-

fer." It cannot be known whether this specimen was part of Kieffer's original type series but it could have been. It almost certainly came from the same general locality in France as the type and could be the basis for a neotype designation if one were deemed necessary and no other known specimens were available. Although it generally conforms to Kieffer's (1894) description, it is a poor specimen and has the shrivelled appearance of a specimen put into Canada balsam directly from alcohol with the body contents still intact. Remounting such a poor, tiny specimen might not make the parts more visible, but fresh material collected in France and compared to the specimen would probably allow one to fix the name of *L. lugens*.

Neuromyia Felt (1911), based on *Ledomyia minor* (Felt), is a subjective synonym of *Ledomyia*. *Ledomyia* in the strict sense now includes the previously described species listed below. All but three of those species were caught in flight. *L. flavotibialis*, *lineata*, and *lugens* were reared in association with logs, the last two from fresh cut and stacked logs held overwinter.

Ledomyia aestiva (Mamaev). New Combination. Europe.

Ledomyia alternata (Mamaev). New Combination. Europe.

Ledomyia brevicauda (Felt). Eastern North America.

Ledomyia flavotibialis (Felt). Eastern North America.

Ledomyia lepida (Mamaev). New Combination. Europe.

Ledomyia lineata Kieffer. Europe.

Ledomyia lugens (Kieffer). Europe.

Ledomyia minor (Felt). Eastern North America.

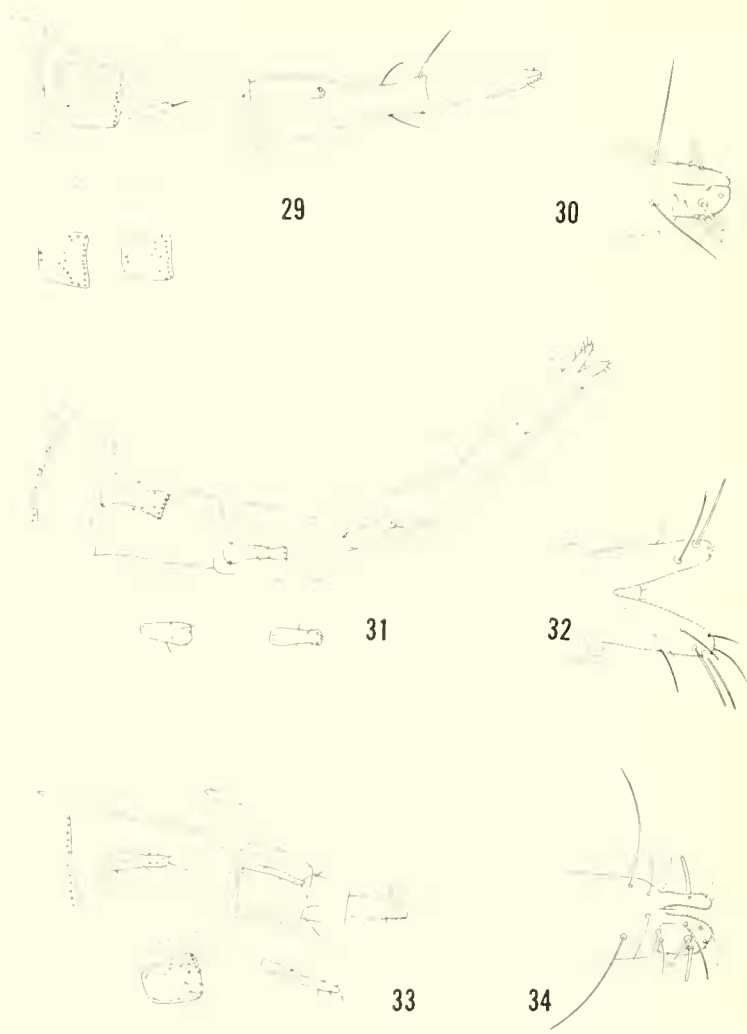
Ledomyia phosphila (Felt). Eastern North America.

Ledomyia styloptera Kieffer. Seychelles Is.

KEY TO NEARCTIC SPECIES OF *LEDOMYIA* (S.S.)

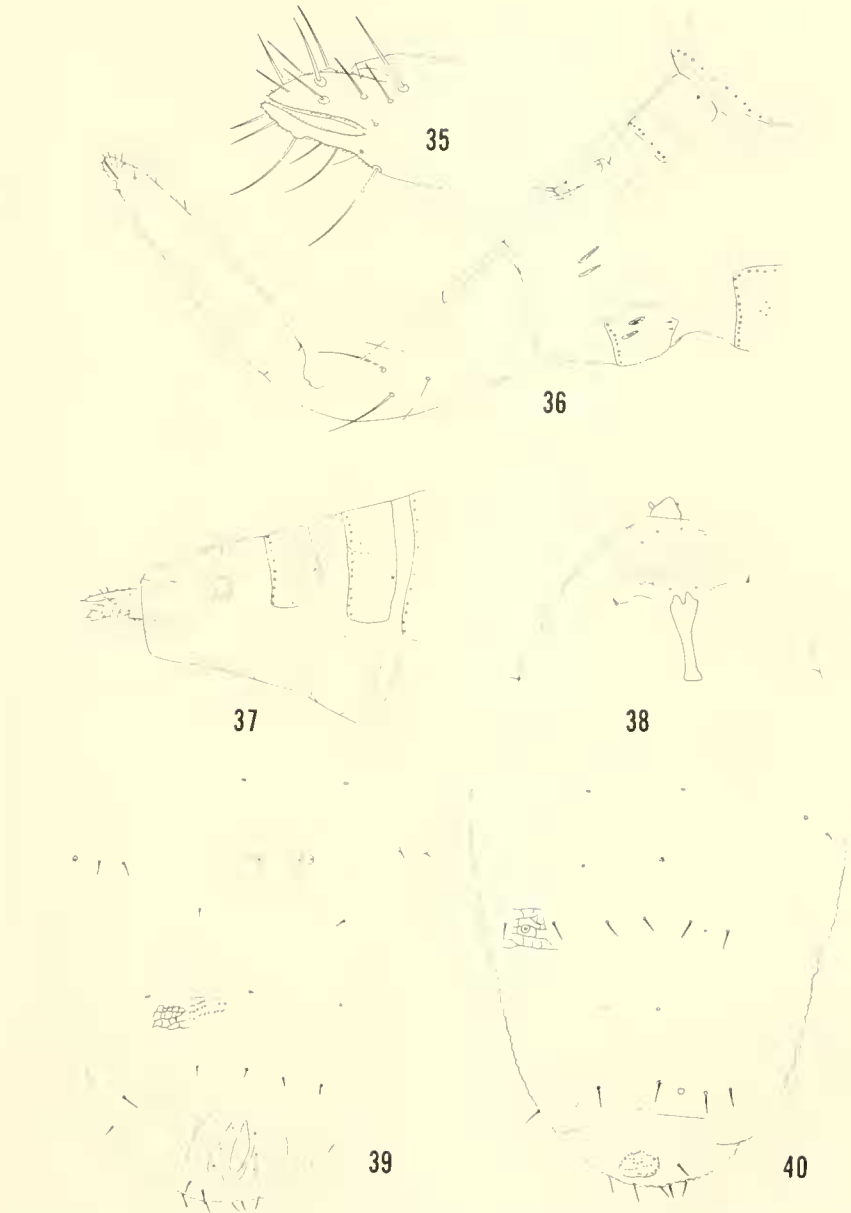
Both sexes are known only for *flavotibialis* and *emilyae* new species. Felt caught a female similar to *brevicauda* at the same time he took the male holotype of *phosphila*. In Felt's Collection that female is labelled "*phosphila*," so it is possible that *brevicauda* and *phosphila* are synonyms. On the other hand, E. Rock reared three species from the same cord of oak logs. Felt (1915) wrote that the antenna of *phosphila* "probably" had 12 flagellomeres, but all but the basal two are lost on the slide preparation of the *phosphila* type-specimen.

1. Antenna with 12 flagellomeres 2
 Antenna with 8–10 flagellomeres 3
2. Female (postabdomen as in Fig. 37) *L. brevicauda* (Felt)
 Male *L. phosphila* (Felt)
3. Antenna with 10 flagellomeres, those of male with neck more than $\frac{2}{3}$
 length of node *L. minor* (Felt)
 Antenna with 8–9 flagellomeres, those of male with neck no more than
 slightly longer than $\frac{1}{2}$ length of node 4
4. Anepisternum covered with scales; female tergites 6–8 long and narrow
 (Fig. 33) *L. mira*, new species
 Anepisternum with scales only on dorsocaudal angle 5
5. Anterior $\frac{1}{2}$ of scutum almost completely covered with scales between



Figs. 29-34. *Ledomyia* spp. female abdomen, posterior end of segment 5 to cerci and detail of cerci (dorsoventral view). 29-30, *L. emilyae*. 31-32, *L. parva*. 33-34, *L. mira*.

- dorsocentral setal rows; female tergite 6 long and narrow, only slightly wider than tergite 7 (Fig. 31) *L. parva*, new species
- Anterior 1/2 of scutum with a distinct bare area between dorsocentral setal rows; female tergite 6 square, much wider than tergite 7 (Figs. 29-36) 6
- 6. Male flagellomere necks slightly more than 1/2 length of nodes; female tergites 6-8 progressively narrower, distal half of ovipositor about 3 x length tergite 5 (Fig. 36) *L. flavotibialis* (Felt)
- Male flagellomere necks about 1/4 length of nodes (Fig. 22); female tergites 7-8 of same width, much narrower than tergite 6 (Fig. 29); ovipositor about 5 x length tergite 5 *L. emilyae*, new species



Figs. 35-40. *Ledomyia* spp. 35-36, *L. flavotibialis*. 35, Female cerci (dorsoventral). 36, Posterior end of segment 5 to cerci of female abdomen. 37, *L. brevicauda* female abdomen, posterior end of segment 5 to cerci. 38-40, *L. flavotibialis* larva. 38, Anterior segments (ventral). 39, Posterior segments (ventral). 40, same (dorsal).

***Ledomyia emilyae* Gagné, NEW SPECIES**

Figs. 22, 24-30

Adult.—*Head*: male antenna with 9 flagellomeres, third with neck about 1/4 length node; female with 8-9 flagellomeres, third with very short neck as in Fig.

23. *Thorax*: Scutal dorsocentral row of setae and scales at midlength about twice width of mesal bare stripe. Anepisternum with scales only on dorsocaudal angle. Tarsal claws all toothed, untoothed on mid and hind claws, or untoothed only on hind claws. Wing: length 8.5–11.0 mm (avg. of 10, 10.0); extreme base of costa with yellow scales and setae, contrasting with dark scales elsewhere; R_5 terminating at 0.92 length wing (avg. of 10). *Male abdomen*: as in Figs. 25–28. *Female abdomen* (Figs. 29–30): Tergite 6 square, with single row caudal setae, scales on caudal half, and 2 basal trichoid sensilla; tergite 7 very narrow with a few to several scales and setae caudally and 2 trichoid sensilla at about $\frac{2}{5}$ length from base; tergite 8 narrow, longer than 7, without vestiture except for 2 trichoid sensilla at about $\frac{2}{5}$ length from base, caudal edge with 2 pits; sternites 6–7 square, unreduced; distal half of ovipositor about 5 times length of tergite 5; cerci short, the sensory setae blunt-tipped.

Holotype.—♀, ex oak logs, Akron, Ohio, VI-6-1982, E. Rock, deposited in National Museum of Natural History, Washington, D.C. Paratypes (all from oak logs and collected by E. Rock unless otherwise indicated): 2 ♂, 4 ♀, Akron, Ohio, VII-12-1982; 2 ♀, Akron, Ohio, VI-7-1982; 5 ♂, 1 ♀, Canal Fulton, Ohio, VIII-1982; 7 ♀, Canal Fulton, Ohio, VI-7-1982; 1 ♀, Malaise trap, North Eastham, Mass., VII-12-1975, R. J. Gagné; 1 ♀, Malaise trap, Montgomery Co., Md., VI-8-1975, R. J. Gagné.

This species is unusual for the fact that the mid and hind claws are toothed on some specimens, untoothed in others. Alternatively, one could define the specimens with or without toothed claws as distinct species, but they would have identical female postabdomens.

Ledomyia emilyae is named in honor of Emily A. Rock, the collector of the six species described in this paper.

Ledomyia mira Gagné, NEW SPECIES

Figs. 23, 33–34

Adult (♀ only).—*Head*: Antenna with 8 flagellomeres, the last segment partially divided in some specimens, 3rd flagellomere with very short necks as in Fig. 23. *Thorax*: Scutal dorsocentral row of setae and scales at midlength narrower than mesal bare stripe. Anepisternum covered with scales. Tarsal claws all toothed. Wing: Length 1.2–1.4 mm (avg. of 5, 1.4 mm); extreme base of costa with yellow scales and setae, contrasting with dark scales elsewhere; R_5 terminating at 0.97 wing length (avg. of 5). *Female postabdomen* (Figs. 33–34): tergite 6–8 greatly narrowed but not longer than previous tergites, each decreasing gradually in width, with sparse setae and scales, scattered on distal half, and 2 basal trichoid sensilla basally; sternites 6–7 subequal, narrowed, with sparse setae caudally and 2 trichoid sensilla basally; ovipositor about 3 times length tergite 5; cerci long, the sensory setae also long, tapering to dull point.

Holotype.—♀, ex oak logs, Canal Fulton, Ohio, VI-7-1982, E. Rock, deposited in National Museum of Natural History, Washington D.C. Paratypes: 6 ♀, same data as holotype except 1 collected on VI-5-1981 and 2 on II-12-1982.

The name *mira* is an adjective meaning marvellous.

***Ledomyia parva* Gagné, NEW SPECIES**

Figs. 22, 31–32

Adult (♀ only).—*Head*: Antenna with 9 flagellomeres, 3rd with very short neck. *Thorax*: Scutal dorsocentral rows of setae at midlength continuous with one another, not separated by a bare stripe. Anepisternum with scales only on dorsocaudal angle. Tarsal claws all toothed. Wing (Fig. 22): length, 1.0–1.4 mm (avg. of 10, 1.1 mm); extreme base of costa with yellow scales and setae, contrasting with dark scales elsewhere; R_5 terminating at 0.90 length wing (avg. of 10). *Female abdomen* (Figs. 31–32): tergite 6 very narrow, with scattered setae and scales on distal half and 2 trichoid sensilla basally; tergite 7 narrow and longer than 6, with a few long setae caudally and 2 trichoid sensilla at about two-fifths length; tergite 8 short, narrow, about half length of tergite 7, on some specimens with 2 trichoid sensilla evident near midlength; sternite 6 approximately square with reduced vestiture; sternite 7 very narrow and elongate, with a few long setae caudad and 1–2 trichoid sensilla at about two-fifths length from base; ovipositor about 4.3 times length tergite 5; cerci short, the sensory setae blunt-tipped.

Holotype.—♀, ex oak logs, Canal Fulton, Ohio, VI-5-1981, E. Rock, deposited in National Museum of Natural History, Washington. Paratypes: 12 ♀, all with same data as holotype except 1 collected on VI-8-1981, 6 on VI-7-1982, and 3 on VI-12-1982; 3 ♀ ex hickory logs, Canal Fulton, Ohio, VI-8-1981, E. Rock; 1 ♀, Urbana, Ill. VI-28-1915.

The name *parva* is an adjective meaning tiny.

***Trichopteromyia* Felt (Lestremiinae: Micromyini)**

The new species described below is the second known in this genus. The other, *Trichopteromyia modesta* Williston, is known from North America, the West Indies, Europe, and the Seychelles Islands. *Trichopteromyia modesta* was taken from hornbeam wood in Russia and its larva was described by Mamaev and Krivosheina, 1965. The new species will key to *Trichopteromyia* in Gagné (1981).

***Trichopteromyia denticauda* Gagné, NEW SPECIES**

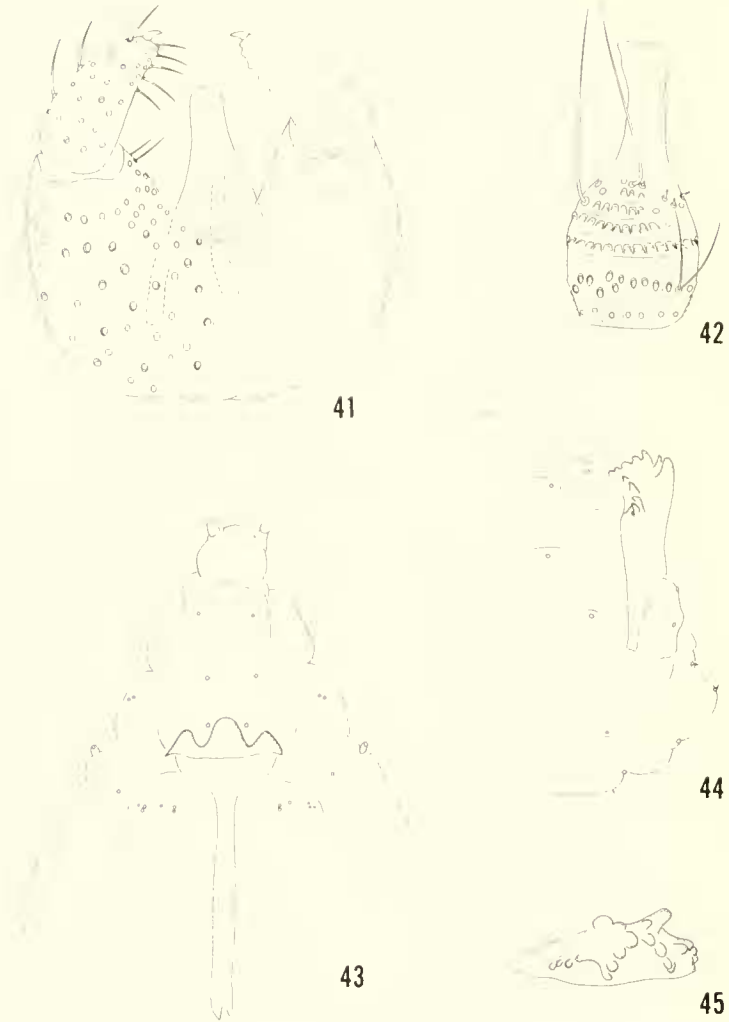
Figs. 41–45

Adult.—*Head*: Eyes large, 7–8 facets long at eye bridge. Palpus 3-segmented, segment 1 large, globular, segments 2 and 3 long, narrower than 1, segment 3 about twice length of 2. Antenna: number of flagellomeres unknown because apical segments are lost; male flagellomere 4 (Fig. 42) with 4 crenulate whorls of setae ventrally, 1 dorsally. *Wing length*: male, 2.0–2.1 mm. *Male abdomen*: Terminalia as in Fig. 41.

Last instar larva.—Length, 5.6–7.2 mm. Sternal spatula tridentate (Fig. 43). Caudal segment with a sclerotized dorsal comb (Figs. 44–45).

Holotype.—♂, from oak logs, Canal Fulton, Ohio, VIII-1982, in National Museum of Natural History, Washington, D.C. Paratypes, ♂ and 5 larvae, same data as holotype.

The larva of *T. modesta* described in Mamaev and Krivosheina (1965) is elongate, as is the new species, but the terminal segment of *modesta* has 2 long, sclerotized projections instead of a comblike structure. Adult gonocoxites are more



Figs. 41–45. *Trichopterymyia denticauda*. 41, Male genitalia (ventral). 42, Male flagellomere 4. 43, Larval anterior segments (ventral). 44, Larval posterior segments (lateral). 45, Larval posterior comb (dorsal).

broadly joined and the paramere is greatly narrowed at midlength in *denticauda*. The eye bridge of the new species is 7–8 facets long as opposed to 6 facets long in *modesta*.

The name *denticauda* is a noun in apposition and refers to the comblike structure of the terminal larval segment.

CHANGES IN A KEY TO GENERA

The two genera new to the Nearctic fauna and the redefinition of *Ledomyia* necessitate the following changes in the key to cecidomyiid genera in Gagné (1981):

1. Couplet 130. On line 6 change last sentence to, "Female flagellomeres with distinct, usually long necks," and change "131" to "131a."

2. Couplet 131. Change to 131a. On line 2, replace, "*Clinodiplosis* Kieffer, in part" with "131b." Delete line 3.

3. Add new couplets 131b and 131c:

131b. Aedeagus and hypoproct approximately as long as gonocoxites, more or less parallel-sided; hypoproct narrowing apically; ovipositor less than $\frac{1}{2}$ length abdomen, the cerci large *Clinodiplosis* Kieffer, in part
See couplet 121.

– Aedeagus much shorter than gonocoxites, tapering from base to pointed apex; hypoproct widest beyond midlength; ovipositor very long, usually longer than abdomen, the cerci tiny 131c.

131c. Male hypoproct simple, narrowed at apex, with recurved setulae; gonostylus strongly curved, striate throughout; female mouthparts inflated, hypopharynx lined with teeth *Trogodiplosis* Gagné
1 sp., *flexuosa* Gagné

– Male hypoproct bilobed, without recurved setulae; gonostylus only weakly curved, not conspicuously striate; female mouthparts tapering, lined with long, fine setulae as in male *Xylodiplosis* Kieffer
1 sp., *longistylus* Gagné

4. Couplet 179. Change to "179a." On line 5 replace "*Ledomyia* Kieffer (sens. lat.)" with "179b." Delete line 6. Add new couplet 179b:

179b. R_5 shorter than wing, curved to join C anteriorly of wing apex; male gonostylus short, stubby, dorsoventally flattened, widest at apical tooth; female postabdomen protrusible although short in some species . . .
. *Ledomyia* Kieffer (sens. str.)
7 spp., Gagné 1985

– R_5 at least as long as wing, joining C at or posteriorly of wing apex; male gonostylus long, cylindrical, tapered from base to narrow tooth; female abdomen not protrusible *Ledomyia* Kieffer (sens. lat.)
12 spp.

ACKNOWLEDGMENTS

I thank K. M. Harris, Commonwealth Institute of Entomology, London, for his criticisms of a draft of this paper, and Mary Lou Cooley, Systematic Entomology Laboratory, for inking the drawings.

LITERATURE CITED

- Bakhshi, M. and P. Grover. 1976. On the study of cocoons of some gall-midges (Cecidomyiidae: Diptera). *Cecidol. Indica* 11: 83–115.
- Barnes, H. F. 1951. The occurrence of xylophilous gall midge larvae (Dipt., Cecidomyiidae) in the pantry. *Entomol. Mon. Mag.* 36: 241.
- Felt, E. P. 1911. A generic synopsis of the Itonidae. *J. N. Y. Entomol. Soc.* 19: 31–62.
- . 1915. Appendix: A study of gall midges. II. *N.Y. State Mus. Bull.* 175: 79–213, pls. 1–15.
- Gagné, R. J. 1976. New Nearctic records and taxonomic changes in the Cecidomyiidae (Diptera). *Ann. Entomol. Soc. Am.* 69: 26–28.
- . 1981. Cecidomyiidae, pp. 257–292. In McAlpine, J. F. et al., eds., *Manual of Nearctic Diptera*. Vol. 1. Research Branch, Agriculture Canada. Monograph No. 27. vi and 674 pp.
- Grover, P. 1967a. *Xylodiplosis fici*—a new midge from *Ficus carica* L. *Cecidol. Indica* 22: 133–137.

- . 1967b. Studies on Indian gall midges. XX. Two gall midges reared from the leaf galls of pipal (*Ficus religiosa* L.). *Marcellia* 34: 45–56.
- . 1979. A revision of the subfamily Cecidomyiinae. *Cecidol. Indica* 14: 10–186.
- Kieffer, J. J. 1894. Ueber die Heteropezinae. *Wien. Entomol. Z.* 13: 200–212, pl. 1.
- . 1895. Changement de nom. *Bull. Soc. Entomol. Fr.* 64:cccxx.
- . 1900. Monographie des cécidomyides d'Europe et d'Algerie. *Ann. Soc. Entomol. Fr.* 69: 181–472 & pls. 15–44.
- . 1904. Nouvelles cécidomyies xylophiles. *Ann. Soc. Sci. Bruxelles* 28 (Mem.) 367–410.
- . 1911. No. XIV. Diptera, Cecidomyiidae, der Seychellen-Inseln aus der Sammlung von Mr. H. Scott. *Trans. Linn. Soc. Lond.* (2), *Zool.* 14: 315–330.
- . 1913. Diptera. Fam. Cecidomyiidae. *Genera Insectorum*. Fasc. 152, 346 pp., 15 pls.
- Mamaev, B. M. 1967. Gall midges of the USSR. 7. New species of non-cecidogenous gall midges of the tribe Oligotrophini (Diptera, Cecidomyiidae). *Entomol. Obozr.* 46: 873–883. (Transl. in *Entomol. Rev.* 46: 522–528).
- Mamaev, B. M. and E. P. Krivosheina. 1965. Larvae of gall midges. Diptera, Cecidomyiidae. *Akad. Nauk USSR*. Moscow. 278 pp.
- Mani, M. S. 1934. Studies on Indian Itonididae (Cecidomyiidae: Diptera). *Rec. Ind. Mus.* 36: 371–451, pl. VII.
- Meigen, J. W. 1818. Systematische Beschreibung der bekannten europäischen zweiflügeligen Insekten. Vol. 1, xxxvi & 333 pp., pls. 1–11. Aachen.
- Möhn, E. 1955. Beiträge zur systematik der larven der Itonididae (= Cecidomyiidae, Diptera). 1. Teil: Porricondylinae und Itonidinae Mitteleuropas. *Zoologica* 105 (1 & 2): 1–247 & 30 pls.
- Morge, G. 1975. Dipteren-Farbtafeln nach den bisher nicht veröffentlichten Original-Handzeichnungen Meigens: "Johann Wilhelm Meigen: Abbildung der europaischen zweiflügeligen Insekten, nach der Natur." *Pars. 1. Beitr. Entomol.* 25: 383–500.
- Rock, E. A. and D. Jackson. 1985. The biology of xylophilic Cecidomyiidae (Diptera). *Proc. Entomol. Soc. Wash.* 87: 135–141.
- Stephens, J. F. 1829. A systematic catalogue of British insects. Vol. 2. 388 pp. London.
- Westwood, J. O. 1840. Order XIII. Diptera Aristotle, pp. 125–58. *In* An introduction to the modern classification of insects. Synopsis of the genera of British insects. 158 pp. London.
- Winnertz, J. J. 1853. Beitrag zu einer Monographie der Gallmücken. *Linn. Entomol.* 8: 154–322, 4 pls.